

Score: \_\_\_\_\_/136 pts

## A Finely Crafted O'Brien Unit 5 Opportunity Day

**Instructions:** You may use a calculator and Geogebra on the first two pages of this Opportunity Day. Use a *sharp* pencil and a straight edge. Show all work and circle your answer. Unless otherwise specified you can leave equations in any form you choose. Show all your work for partial credit, since there are no Supercorrections for this Opportunity Day. If you get stuck on a question and it is preventing you from doing later questions, please come up and see Mr. O'Brien for help (you will not gain credit for help received from Mr. O'Brien, though).

1. What are the three *generic equations* (in terms of  $m, a, b, A, B$ , etc.) for lines covered in this unit?

Point Slope Form

$$y - y_0 = m(x - x_0)$$

Slope Intercept Form

$$y = mx + b$$

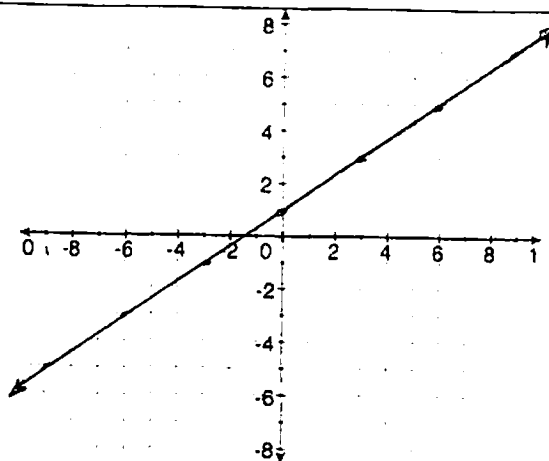
Standard Form

$$Ax + By = C$$

2. Neatly and accurately draw the graph of a line with a y-intercept of 1 and a slope of  $\frac{2}{3}$ . Give its equation.

Equation:

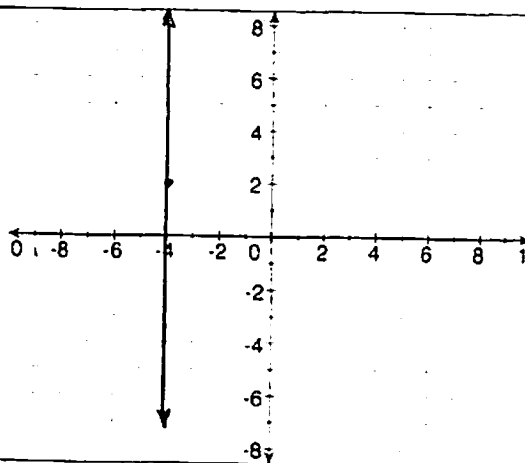
$$y = \frac{2}{3}x + 1$$



3. Draw the graph of a line passing through  $(-4, 2)$  that is parallel to the y-axis and give its equation.

Equation:

$$x = -4$$



4. Below is a table of values for a line. Fill in the two missing values and then find an equation. (Hint: Sketching a graph may help!)

x	-4	-3	-2	-1	0	1	2	3
y	-8	-4	0	4	8	12	16	20

Equation:

$$y = 4x + 8$$

5. Complete the table with four values and a graph for the equation  $y = -\frac{3}{4}x + 4$ .

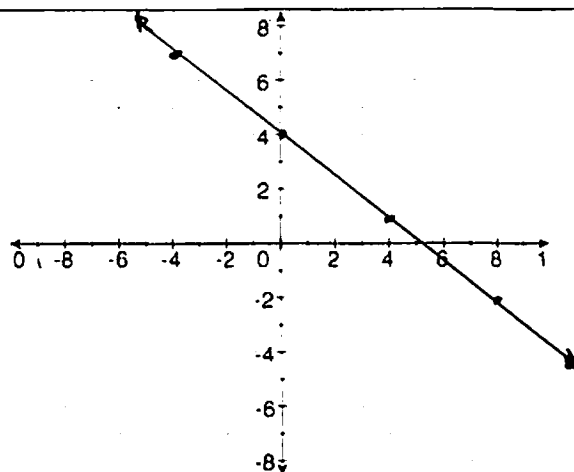
$x$	0	$16/3$	8	-4
$y$	4	0	-2	7

$$0 = -\frac{3}{4}x + 4$$

$$\frac{3}{4}x = 4$$

$$3x = 16$$

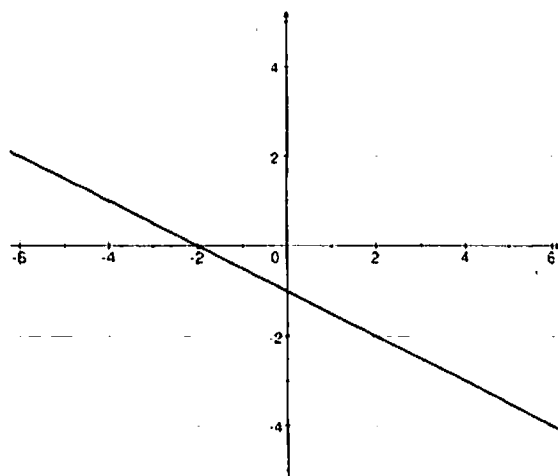
$$x = 16/3$$



6. Find the slope, the  $y$ -intercept, and write an equation of the line.

slope:  $-\frac{1}{2}$   $y$ -intercept:  $-1$

equation:  $y = -\frac{1}{2}x - 1$



7. Consider the relation  $\{(10, 3), (5, 2), (2, 1), (5, -2), (10, -3)\}$ .

a. Describe its domain and range.

Domain:  $\{2, 5, 10\}$

Range:  $\{-3, -2, 1, 2, 3\}$

b. Determine whether it is a function. Explain your reasoning.

No - 5 matches with both 2 and -2.

8. Find the slope of the line that passes through  $(2, 7)$  and  $(5, 12)$ . Then find the equation of the line passing through the two points.

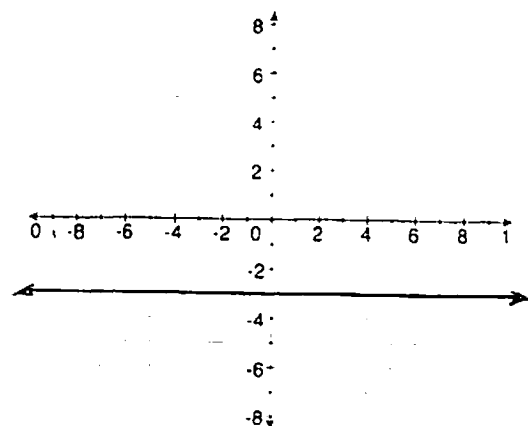
Slope:  $\frac{12-7}{5-2} = \frac{5}{3}$

Equation:  $y - 12 = \frac{5}{3}(x - 5)$  etc

9. Sketch the graph of the line  $y = -3$ . What is its slope?

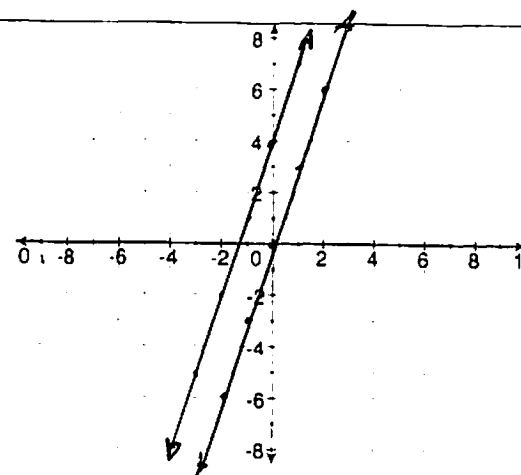
Slope:

Zero.



10. Graph the line  $y = 3x$ . Then sketch the graph of a line that is parallel to  $y = 3x$  and write its equation.

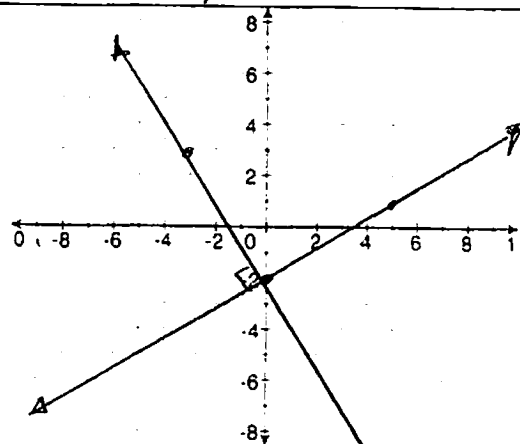
Equation:

 $y = 3x + 4$  etc.

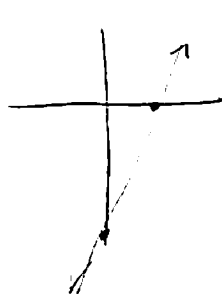
11. Graph the line  $y = \frac{3}{5}x - 2$ .

Then sketch the graph of a line that is perpendicular to  $y = \frac{3}{5}x - 2$  and write its slope.

Slope of perpendicular line:

 $-\frac{5}{3}$ 

12. Write the equation of a line having an  $x$ -intercept of 4 and  $y$ -intercept of  $-10$ . (Hint: A graph could help!)



$$m = \frac{10}{4} = \frac{5}{2}$$

$$y = \frac{5}{2}x - 10$$

13. Write the line  $7x + 3y = 12$  in slope-intercept form and determine its slope.

$$3y = -7x + 12$$

slope-intercept form of the line:

$$y = -\frac{7}{3}x + 4$$

slope:

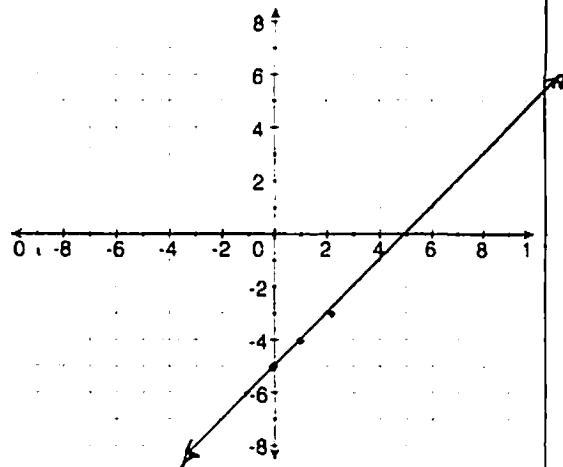
$$-\frac{7}{3}$$

14. Graph the line  $x - y = 5$ . Find its slope.

$$x - 5 = y$$

slope:

$$1$$



15. If  $y$  varies directly as  $x$  and  $y = 12$  when  $x = 4$ , find:

a. the constant of variation,  $k$

$$k = 3$$

b. an equation of direct variation

$$y = 3x$$

c. the value of  $x$  when  $y = 18$

$$x = 6$$

d. the value of  $y$  when  $x = 8$

$$y = 24$$

16. Go to the class website and do the problems. Write your score below.

Score: 4 out of 4

17. Go to the class website and do the problems. Write your score below.

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